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A Refutation of the Marxian Doctrine

and a

DEFENSE OF CAPITALISM

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Foreword

Is Capitalism a temporary system of society, eventually to be followed by some other form of society, such as communism, or, is capitalism a permanent form of society much misunderstood and misjudged even by those who are its advocates? If a sound and convincing answer can be made to this question, would it not have a far reaching effect? As we view the national and international scene, we observe that the underlying motives behind the many attempts to change or improve the status of people in all parts of the world is the thought that if the capitalistic system could be altered, existing difficulties could be removed, and we could then transport ourselves into an ideal state.

In spite of great advance in scientific areas there has not appeared a social science capable of

unifying the actions of leaders throughout the world. To the contrary, we find many conflicting points of view. There are as many political and social doctrines as there are countries.

"There is, it must be confessed, no science of human society properly so-called." It would appear in fact that we have been "without any real knowledge of the laws of its life and development or the principles which underlie the process of social evolution which is proceeding around us." [1] We have been in possession "merely of a heap of vague empirical observations, too flimsy to be useful in strict logical inference." [2]

Of all utopianisms, Marxism has gained the greatest following, principally because it appears to be scientific. But this is more apparent than real. To accuse the Marxian socialists of being without a true scientific foundation is indeed inviting the wrath of devout disciples who are now in ever increasing numbers working for the day when this so-called temporary capitalistic state shall be displaced by that greater and more noble state and brotherhood of man. It is incredible that vital

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[1] Benjamin Kidd, "Social Evolution," New York: G. P. Putnam's Sons.

[2] Presidential Address, Annual Meeting of the Social and Political Education League, March, 1892.

flaws in the doctrine are not apparent to the enthusiastic supporters of Marx. Marx tells us, for instance, that the underlying force in society is the class struggle. This, in fact, is the foundation of the Marxian philosophy, to be observed in the history of man's past and in the present. But, according to Marx, the class struggle will be nonexistent in the future. What then becomes of this permanent foundation following the revolution? True foundations in science do not disappear overnight.

In the following pages an attempt has been made to reveal capitalism in its true light. Marxism, and its "Scientific Socialism" in turn, is revealed as a superstition no less utopian than any other utopianism. The Marxian doctrine has attracted throughout the world a multitude of fervent followers, and our institutions of learning are becoming hotbeds of revolution because the doctrine appears scientific. But is it? Only a few theories out of the immense numbers which have appeared in the broad field of human thought and knowledge have remained intact. Sooner or later an organic defect, a flaw, is discovered which spells the end of the theory.

CHAPTER I

Human Progress and Invention

CHAPTER I

HUMAN PROGRESS AND INVENTION

KARL MARX is looked upon by millions as the saviour of mankind—as one who has shown the way to a greater life for all. But actually Marx has failed. He has failed miserably to produce a social science with which men can build a better world. Tragically he has led millions into a blind alley. It is true, nevertheless, that Marx was a big step ahead of all his predecessors in his approach to the problem of human development. His great contribution was the observation that "man changes as his tools of production change". Simply stated this sounds obvious and trivial, but when adequately examined the idea assumes tremendous importance. Karl Marx says, "It is not will, it is not consciousness, it is not spirit and it is not reason which determines changes in history and social relationship, but the material factor of changes in tools—in the means and methods of production. As these change—every thing changes in society." And then Marx introduces his fa-

mous classic formula of development and progress in human society: "Hand mill—antique society, with its slaves and its slave owners; water mill—feudal society, with its seigneurs and bonded peasants; steam mill—modern society with its capitalists and wage earners". And one rejoices at this Marxian concept, so capable of substantiation, and begins to realize why the thought has made such a furor in science and philosophy and why it has found so many ardent and devoted followers.

This treatise is written, however, not so much to praise Marx as to show how and why after such a splendid attempt he failed in his objective of developing a material conception of history. If there is one thing that all good Marxists are sure of, it is that Marx wrote a material system of sociology. Actually he failed to do so because he did not find the factor which will account for changes in productive forces. It is all very well to say that changes in tools and means of production determine changes in society and history. But the question still remains: What causes the changes in tools of production themselves? Marx proclaims in one breath that it is

not reason or will or anything but the material factor of changes in tools of production that transforms society; but in the same breath he says that man creates his own tools of production and can also create his own society. First Marx states that men are the result of their environment and then states that men make their own environment. According to the Marxists, "Man will make a revolution and Capitalism will be ended." But man does not create his tools of production nor does he create his own society any more than he creates his own body or the environment in which he lives. Creation of a new society is a mighty task not within the capacity or scope of man. Man does not create. He is an animal that adapts himself to his environment, and therein lies a world of difference. Man creates nothing. Marxists are creationists. They would destroy that which already exists and build anew—an ideal which, if persistently followed, would wreck the world.

To understand man's place on earth we must begin at the beginning and state that man is an animal dependent upon his environment for existence. He differs from other animals in that he uses tools. Without tools man still would be

a savage. His whole advance has been a history of changes in his tools. Technique and the causes which make for development of man's technique are the very foundation of progress. But Marx has not concerned himself with the most important question—what factor determines development of technique? A few of Marx's critics have recognized this shortcoming of the Marxian doctrine. George Plehanoff, the Russian, has pointed out that the "real cause" which determines changes in social relationship is that cause which determines changes in productive forces.

When we speak of changes in tools of production, or development of technique, we are speaking of inventions. It is this phenomenon of inventions in which we all are interested. Therein lies the answer to the question, "What factor determines changes in tools of production?" Many sociologists have been attracted by the phenomenon of inventions but have failed to recognize its true importance. Without inventions there would be no tools and without tools no civilization.

How does man invent? Possibly to explain the phenomenon of inventions would be to explain not

only how man improves his status on earth but also how he thinks. The problem of how man acquires new knowledge is not only sociologically important but also philosophically important. Epistomology, or the theory of man's mental development, has always troubled the philosophers. Explain inventions and you will explain what kind of creature man is and in what kind of society he can best function. The best society becomes, then, the society in which man has the greatest opportunity to invent. To make progress man must have tools, both of production and distribution, and he cannot have these tools without inventions. We must deal, therefore, with inventions.

The history of the evolution of man since the days of savagery has been a history of the evolution of his tools. Man is a tool-using and tool-making animal. It is impossible to disassociate man and the instruments of his development. The knowledge of how to improve a tool comes when an invention occurs. The cause of the invention is the source of man's advance. Accepted as axiomatic and prevalent in today's economics is

the idea that whenever it suits man's convenience he can go ahead and do with his machines and implements of production what he pleases—make them change as he desires. But this is a false idea which leads to a multitude of errors.

What actually does occur when an invention occurs? After the invention has taken place we know something *new;* we know something we did not know before; we know more than we knew before. When an invention happens something very peculiar happens—a new bit of knowledge, *unsought* for and *unlooked* for, reveals itself before the inventor and the world, and, since an invention is always very simple and elementary in its nature, both inventor and world wonder why it did not occur before? This phenomenon is well known. It is also well known that the new knowledge thus revealed becomes at once the background in greater or lesser degree for a new understanding of things and in the course of time for a new consciousness. In using the word invention we are speaking naturally of discoveries, and especially of inventions which reveal fundamental new knowledge, for example, the discovery of glass. In the production of glass we have a

splendid example of the effect of an invention on man's consciousness. The use of glass has made possible the development of the science of optics, which has opened up to man the marvels of both the microscopic and the astronomical worlds.

To the knowledge of generations before us and to mankind's accumulated knowledge a new bit of knowledge is added when a discovery or invention is made, and the human outlook is at once altered. Whence came the new bit of knowledge? The opinion has always been that the new bit of knowledge comes from the mind, that man uses his will and reason to make inventions. But can a mechanic improve a tool by the mere exercise of his will and reason? It would indeed be a strange world if men could improve machines and instruments at will. Before you are able to improve an instrument or a machine you must know *how* to improve it; this knowledge does not come until after a discovery has been made, and the discovery cannot be made until there has been a contact between the discoverer and the discovery.

It is an old debate among philosophers whether deduction ever gives *new* knowledge. It has

always been suspected that there must be something besides deduction to account for new knowledge. Psychologists of the present day and the disciples of Aristotle of ancient days refer to observation and experience as the foundation of knowledge. But observation and experience are a subjective explanation of knowledge. The epistemological problem, that is, the question of how we transcend the subjective in our knowledge, exists at the outset of philosophy.

It is a startling fact that all our fundamental discoveries and inventions have been accidental—not the fruits of a will-to-discover, a desire, an urge. Where is this wonder-working mind and reason, once we turn for a moment to hard facts and mechanics? The ancients knew how to temper bronze; of this we have ample proof. But today we do not know how to temper bronze, although we need it in our industry. Many attempts have been made to rediscover this lost knowledge but without success. Perhaps accidentally someone may stumble upon it. If so, what about the "creative power" of our mind and reason?

Take another example. Here is a machine. It is necessary that the machine be run at a higher

speed. But when it is run at a higher speed, it becomes hot and cannot be run any longer. We try new lubricants, or new bearings, or both, or we do something else; we apply, in a word, all our knowledge, all our mind and reason to the problem, but the solution is not forthcoming. We are compelled to quit, since we cannot proceed on the basis of past accumulated knowledge.

But somewhere, perhaps on the other side of the world, a man is working at something entirely different. Let us say he is experimenting with acids, and he finds in the bottom of his retort a sediment, which, after analysis, proves to be a metal; this, after further analysis, proves to be more heat-resistant than all other metals. An invention has been made and we immediately know how to improve our machine, and perhaps may use the new and so singularly revealed knowledge for many other purposes.

The age-long mystery of Damascus blades has been recently solved according to a news dispatch. "The so-called Damascus blades were made in India, but got their name from the market whence they were distributed to the west. For a thousand

years or more, no western smith had been able to account for the steel contained in them, much less reproduce it. The Scimitar of Saladin, famed in history as the first blade ever drawn from a scabbard, has for many hundred years been the traditional symbol of perfection in the steel temperer's art. Now the X-ray has brought to light the secret of how this famous blade was manufactured." And small wonder. The X-ray was an accidental discovery. There never was new knowledge that came from desire. Human mind is only accumulated knowledge.

Where is that mind, that reason, or that so-called necessity and all its creative powers, if we have been unable for all this time to contend with the trifles just described?

Candidly, it must be admitted that in comparison with all previous sociology Marx managed to compile what appears on the surface to be a scientific sociology. His explanation of changes in society resulting from changes in tools of production has caused a big furor among the intelligentsia. At last here was a man who spoke of society in terms of material reality. But, sad to relate, Marx

did not go far enough. A little deeper analysis would have brought Marx not to revolution but to evolution.

Marx states positively that changes in tools of production bring about changes in society, and then concludes by stating that man makes his own history. A similar about-face is apparent when Marxists speak of the class struggle. Has not there always been a class struggle? And do we not have a class struggle going on at the present time? In fact the Marxians become high pitched when speaking about the class struggle and identify it with the Darwinian theory of the struggle of the species for survival. It is all so scientific. And the strange part of it all is that up to this point the Marxists are biologically correct. The class struggle makes an excellent foundation for analysis of society and can be readily substantiated. But suddenly the Marxists become revolutionists, depart from evolution and decide that the class struggle shall no longer operate. A revolution shall be made and classes shall be eliminated. The struggle shall be ended. It would be just as reasonable to say that tomorrow the law of gravi-

tation shall no longer operate. But unfortunately the class struggle is not so easily done away with.

We have indicated that a deeper analysis of changes in tools of production, or of productive forces, is necessary to arrive at a clear picture of man's place on this earth. At one time man roamed the forest and lived in the trees and had no tools whatever. In those prehistoric days man was an animal depending upon his limbs and his teeth for existence. In what manner and by what method did this animal become a man? Surely it could not have been a conscious effort on the part of this animal. The animal could not have decided suddenly to become a man. Then by what unconscious process did the transformation take place? If we can indicate that the process by which this animal became a man is an unconscious process, that the development of man's tools is an extension of this same process, and that man's society changes as these tools change, then we are in a position to say that man does not change his society deliberately and that therefore social revolutions arbitrarily created by man are nonsense. The sequence in human affairs is not an arbitrary setting up of social forms and relationships by

man, following which man creates tools for this purpose, but rather a slow process of changes in his tools of production and distribution, which in turn have their retroactive effect on man's customs, habits, and institutions. Simply put, man is as his tools are, tools first and social institutions second.

It is these tools, these instruments of production and distribution, and especially their improvements, with which we are vitally concerned. Let us consider the first tool. It was a club, possibly just a stick, a limb of a tree. Primitive man found that he could hold a stick in his hand, found that he could manipulate it. The evolutionary process of differentiation and adaptation had finally resulted in a creature (primitive man) that had the capacity to clutch a stick in its hand and wield it. And as he wielded it his mentality grew. The psychologists will point out that the handling of the stick caused man's brain to grow, that the stick educated man. We have all been under the impression that the brain of primitive man recognized the value of the stick and then used it for his own purposes. But it is just the reverse. The handling of the stick by primitive man developed nerve and muscle control, and developed new cells

in the brain, which later developed into a consciousness of the value of the stick. It was the stick that made for the mentality of man. Man did not make the stick. The animal was transformed into a man by the stick.

The origin of the conscious act of using the stick as a club for protection is to be found in the unconscious relationship of the animal equipped with a prehensile organ and a stick. In the study of this relationship is to be found the solution of the riddle of human consciousness. When, after a very long association with the limbs of trees and with sticks, our early ancestor seized his stick by the thinner end to make the blow more effective, it was a conscious act and an exhibition of human mind, but the physical contact of the animal with the stick was the starting point. To select a longer stick in preference to a shorter stick is a display of mentality, but in the final analysis represents merely a biological selection based upon the physical qualities of size and weight. It may have taken primitive man ages of experience with the stick before he could distinguish between a long one and a short one.

It is through our senses that we find out about

the world, but contact is fundamental to our senses. Our senses cannot dictate the direction, scope, or character of our contact with the external world. As an evolutionary series they are secondary. It is only after the contact has occurred that the sense perceptions are brought into play. Everything then hinges upon the chance occurrence of contact of the living organism with the external world.

We are accustomed to speak of five senses, but in truth there is only one sense, which is the sense of touch, or the sense of contact. All the other senses, hearing, smell, sight, and taste are but variations of the sense of touch, and all depend on contact with the physical world for their functioning. When we hear a sound, what actually happens is that we feel the vibrations set up in the air, which impinge upon the drum of the ear and which may be termed as long distance touch with the physical disturbance which set up the vibrations. The same is true of sight, since what we see is but the reflection of light rays from external objects upon the sensory nerves of the eye, which is again an instance of long distance touch or contact. The growth of the living organism has

been the growth of the sensory organism, and without contact the sensory organism would not have developed. The extent of our evolution, therefore, depends upon the extent of our contact with the external world.

The operation of the Darwinian process of evolution in the world of man has never been adequately explained and has therefore caused no end of controversy, but this evolutionary process in the world of man is readily observed when we examine the phenomenon of invention. The same process, revealed by Darwin as operating among the species of lower organisms and the animals, also operates in the human species. An accidental variation in the lower organism occurs and results in a change of adaptation of the organism to its environment. An invention is an accidental variation resulting in a change of adaptation, inasmuch as every invention is an extension of a natural power of man, such as a club, which is an extension of the human hand, or a magnifying glass, which is an extension of the eye, etc. The only difference between the variation of the lower organism and the invention is that in the case of the lower organism the variation is part of the

organism, such as an increased fin of a fish; while in the case of man, the variation, that is the invention, is extraneous to the body of man. However, the result is the same and the Darwinian evolutionary process continues uninterrupted in the human species through the medium of inventions.

From a sociological standpoint the fact that the Darwinian principle operates in the world of man is most important. We are compelled then to view man as a competitive animal subject to the same influences that govern the life of lower organisms. Consequently man becomes a part of nature and not detached from nature. We are able to proceed with a true analysis of man and avoid endowing him with attributes he does not possess. Then individualism rather than collectivism must be looked upon as the system under which men can best live and function. The same individualistic system which operates among the lower species must also operate in the human species. This conclusion is inevitable once we see the extension of the process of variation and adaptation into the life of man. If inventions are varia-

tions and adaptations, then the whole theory of evolution becomes applicable to modern man.

Some students will call attention to the collectivism found in nature and will refer to the findings of such men as Peter Krapotkin, who wrote *Mutual Aid as a Factor in Evolution,* and others. It is not necessary here to participate in this debate. It is sufficient to say that there are indeed numerous examples of mutual aid, but they do not alter the fact that the underlying motivating force in nature is individualistic. It is these superficial evidences of mutual aid that have confused many observers and caused many sociologists to lose sight of the real force at work among species, including the human species.

Most of our Marxians deny the dominance of the individualistic tendency in the life of man and have been somewhat justified in this point of view, since the extension of the Darwinian principle to the human species has never been convincingly demonstrated; but with a consideration of inventions the Darwinian process in the life of man becomes apparent. The theory has been advanced by many that the Darwinian principle did not apply in the human species, that man was an excep-

tion to the law of survival and specially endowed with powers that transcended the powers of the lower animals. Even Darwin himself hesitated to apply his own principle to the development of man's "superior intellectual attainments". But it is obvious that he had overlooked the phenomenon of inventions.

As already stated, when we speak of inventions we are speaking of inventions which reveal new and previously unknown facts. There are many so-called inventions which are merely applications of more fundamental discoveries, and therefore not to be termed as inventions. It is the fundamental new discovery that we are concerned with —that new bit of knowledge that suddenly reveals itself to the gaze of man. There are some who will contend that many inventions are consciously made by inventors, but a closer examination of the efforts of such inventors will reveal that their so-called inventions are only new uses for more fundamental inventions and very often are not entitled to be called inventions. The invention which contains an absolutely new idea, never before known, is always an accidental discovery.

"The evolution of man is well exemplified by a

study of the artifacts of the stone age", writes Dr. George Grant MacCurdy. "The evolution of culture has its parallel in organic evolution, and, like the latter, its pathway is strewn with extinct forms. . . . One invention leads to others by a system of budding and branching, so that a single invention may give rise to a whole cluster of related activities forming what might be called a culture-complex unit." [1]

A myriad of inventions and discoveries have given man a tremendous leverage to his natural powers and have harnessed the forces of nature for his benefit. In the bowels of the earth, on land and sea, and in the air, by means of inventions, man has gained an ascendancy which seems to know no diminishing. What man may achieve by his inventions would be impossible to foretell. The unknown cannot be anticipated. But in the industries and in the laboratories new ways and means of doing things will be revealed, which in turn will have their effect on the life of man.

[1] George Grant MacCurdy, *Human Origins,* (New York: Appleton Century Co., 1933), vol. 2, p. 133.

CHAPTER II

The Character of Invention

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THE CHARACTER OF INVENTION

WE ARE engaged in proving that human society is as advanced as its tools of production and distribution are advanced, that civilization itself is no better than its technique, that technique is the result of inventions, and that inventions are the result of an unconscious process. That last phrase is a challenging statement, for how can one consciously strive for the unknown? No one ever consciously conceived of an entirely new idea. Every new idea is an accidental discovery, a revealment to the discoverer. Some circumstance or combination of circumstances reveals to the observer a new way of accomplishing a result, and, presto, a bit of new knowledge has been acquired.

According to Darwin it is accidental variation that determines the evolution of a species. Every variation in a species is an increase or a decrease in adaptation. An increased thickness of the skin of the animal in cold climates, a longer tooth, a

sharper claw, a better balanced wing, an improvement of the eye, ear, or nose—all such variations are increased leverages giving improved and greater grips upon the external world.

As to inventions, what are they other than mechanical leverages which add power to the normal powers of the body of man? The club, the pick, the hammer, the saw, the tool of any kind, the engine, the motor, the telescope—these are all mechanical leverages, and they alone constitute the means of man's conquest of nature.

The phenomenon of inventions is the extension of the process of accidental variation and adaptation of the animal world into the world of man. That inventions are accidental is readily ascertained, if we review the history of inventions. Frequently it is difficult to obtain the true history of an invention, since many details are shrouded in doubt because of lack of authoritative information. However, where accurate information is available, the accidental character of inventions is confirmed. A number of outstanding examples of inventions and discoveries are given in this chapter. There has been much controversy as to

the difference between an invention and a discovery. In a general sense an invention is the application of a new principle, and a discovery is the finding of the new principle. For the purpose of this writing it is unnecessary to differentiate between them.[1]

The first invention was the using of a stick by the primitive ape as a club or lever. The stick became man's best friend, with which he could dig, extend his reach, pry away a heavy stone, or wage battle or protect himself. It is obvious that the history of such development can only be deduced since there are few records of this period of man's history. Volumes have been written about primitive tools and their development. That this development took very long periods of time extending into eras has been verified by many authorities. At this stage in human evolution the thinking process was very slow and cumbersome, resembling that of the animal. To fashion a handle for

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[1] It is unfortunate that the word accident must be used in connection with inventions since in ordinary parlance an accident suggests the idea of a catastrophe or an occurrence in which damage is sustained, which is not the desired thought at all. There does not seem to be a satisfactory word to express the exact meaning. Perhaps a better word would be chance.

a sharp or pointed stone and attach it with a ribbon of skin was a demonstration of advanced mentality, and to arrive at this stage of human capacity probably took thousands of generations of contact with even less developed tools.

The use of a round log with which to roll a heavy load no doubt ultimately revealed the wheel as an aid to man. Once the principle was clearly understood by man, it was only a question of time before it became an important adjunct in man's climb to civilization. With the aid of the wheel, man literally rolled into civilization.

It must be deduced also that the development of pottery making was the result of a series of discoveries which were made at some time in the history of each primitive people. The first discovery would be that a certain kind of earth was soft when moist and very hard when dry. The second discovery would be that a dish could be made by forming this clay earth when wet and leaving it to dry. The third discovery would probably be that if this clay were mixed with sand it would harden more firmly. Fire-baked clay would be the fourth discovery, and the fifth the

discovery of kaolin, a white powder with which porcelain is made. The Chinese discovered this process at an early date but held their secret for centuries. It was not until the seventeenth century that Boettger of Germany again discovered the method of producing porcelain.

Early man banked his camp fire with pieces of copper ore in some locality where copper ore existed and the next morning discovered glittering hard drops of the metal that had been melted out. With this discovery man stood on the threshold of the age of metal. Later early man discovered that the metal could be used for knives, arrow heads, axes, and tools.

Recorded instances of discoveries and inventions go back to ancient times, and perhaps the first record is the discovery of glass, told by Pliny in the first century A.D. A Roman merchant ship with a cargo of natron, a washing powder, was driven ashore on a beach of fine white sand at the mouth of a river in Syria. The crew lighted a fire on the sand to cook their food and happened, in the absence of rocks, to use lumps of natron from the cargo to prop up their kettle. The heat of the fire fused the natron and the sand to form glass.

With the invention of the telescope a whole new world was opened up to the gaze of man, revealing new facts which in turn became stepping stones for still further knowledge. It is usually supposed that Galileo was the inventor of the telescope, but it has been established that Franz Lippersheim, a spectacle maker at Middleburg, Holland, was the real inventor. We may be certain that this discovery was an accident since neither the theory of optics nor the law of refraction was known at the time. Galileo learned of the existence of an instrument, while visiting Venice in 1609, which would permit an observer to see a distant object as distinctly as if it were near. Galileo, once in possession of the clue, mastered the problem thus suggested and made a telescope which magnified thirty times. With this instrument he discovered the four satellites of Jupiter, the mountains in the moon, and the variable phases of Venus which confirmed the Copernican theory of the solar system.

It is significant that the history of inventions is filled with stories of accidental findings. Reading the history of inventions one wonders why this has not been noticed before, and some parallel drawn

between accidental variations as occurring in the animal world and accidental inventions occurring in the human world.

William Henry Perkin, an English chemist, while heating some aniline oil in his laboratory, got a black tarry mixture in his test tube. When he attempted to wash it out with alcohol he was amazed to get a beautiful purple mixture when he poured in the alcohol. This was the first of the many aniline dyes.

Louis Daguerre, a scene painter for Paris theatres, became interested in 1824 in the idea of fixing an image on a surface. He worked at this idea for many years but without success. One day Daguerre laid a silver spoon on a metal which had been treated with iodine, and when he picked it up he found its image printed on the metal. He tried then to put a silver plate treated with iodine in a crude camera to catch a picture, but seemingly there was no result. Since the plate was too valuable to destroy, he placed it in a cupboard which happened to be filled with chemicals and the next morning discovered to his surprise a fairly clear picture on the silver plate. Apparently some chemical in the cupboard was doing the necessary

work. To determine which chemical it was, he placed each evening a newly exposed silver plate in the cupboard and removed each night a single bottle, hoping by a process of elimination to find the active one. But after all were removed the plate still was developed. A careful search finally revealed that a few drops of mercury had been spilled on the bottom shelf, and the vapor of the mercury was the active agent responsible for bringing out the print on the silver plate.

Wilhelm Conrad Roentgen discovered X-rays in his laboratory at Warzburg in 1895. Roentgen was passing an electric current through a vacuum tube and had covered the tube with a heavy shield of black cardboard. But in spite of this shield a mark appeared on a sensitive, chemically treated paper, revealing the presence of some strong emanation from the tube. Solid objects placed between the tube and a sensitive screen failed to interrupt the rays, and when the human hand was placed between, the outline of the bones showed through the flesh. Roentgen called these rays X-rays: X standing for the unknown.

Hans Christian Oersted in 1819 discovered that a relationship exists between electricity and mag-

netism, which had a profound effect on subsequent investigators and inventions, discoveries coming thick and fast because of the knowledge Oersted revealed. One day while lecturing to his students he placed a wire, through which an electric current was passing, over a magnetic compass so that the wire and the compass were parallel. The needle of the compass swung around at right angles, and when the current was turned off the needle swung back to its original position. By a fortunate combination of the parts of his apparatus Oersted had made a great discovery. Faraday said, "Oersted had opened the gates of a domain in science, dark till then, and filled it with a flood of light". Ampere between 1820 and 1828, with the clue that Oersted had given, founded the science of electrodynamics. In 1831 Faraday thrust a bar magnet into a hollow coil of wire and got a current of electricity. With this information he built a small dynamo in 1832. Our great modern electric power plants would be impossible without the application of this principle.

Charles Goodyear in 1839, by an accident, discovered the secret of successfully curing rubber with sulphur. A specimen of a sticky rubber com-

pound which he was studying was brought carelessly into contact with a hot stove and was charred like leather. When Goodyear plunged India rubber into melted sulphur at great heats the rubber charred, but he noticed the extremely important fact that upon the charred rubber there was a fringe which was not charred and was entirely cured. Goodyear inferred, therefore, that if the charring process could be stopped at the correct point, it would rid the mixture entirely of its stickiness.

Alexander Graham Bell discovered the principle of the telephone, accidentally, in 1875, while experimenting with his "harmonic" telegraph. This telegraph consisted of clock-spring reeds which were vibrated by electromagnets. Bell was receiving messages over the telegraph, which were sent by his assistant, Watson, from an adjoining room. The contact points of one of the reeds became stuck, and Watson tried to pluck the spring free, which caused it to vibrate over the electromagnet. Bell heard this plucking sound over the telegraph in his room. By accident the current was flowing continuously through the electromagnets, and the plucking of the spring had

varied the intensity of the current and thrown into vibration the corresponding clock-spring at the receiving end of the line. This is the fundamental principle of the modern telephone. Immediately Bell recognized the possibilities of what had occurred, and one of the great discoveries in all history was thus made.

Thomas A. Edison invented the phonograph in 1877 when attempting to develop a telegraph-repeater which could cause an embossing needle to automatically record the dots and dashes on a revolving paper disk as they came in over the telegraph line. While testing this apparatus at high rates of speed, Edison noticed that a musical note was given out when the disk revolved very fast. When the needle passed rapidly over the indentations it was made to vibrate like a tuning fork. With the principle of the present phonograph thus revealed to him, Edison had a small model constructed, using a diaphragm to which a small steel point was attached, and for a revolving disk he used tinfoil. Crude as it was, it functioned very satisfactorily, although many years were later spent in perfecting his discovery.

Z. T. Gramme, a Belgian, discovered accidentally in 1873 that a dynamo could be used as a motor. At an industrial exhibit in Vienna a number of dynamos made by Gramme were being set up as exhibits when a careless workman by mistake reversed the connections between the two dynamos. To the astonishment of everyone looking on, the armature of the second dynamo began to revolve, and Gramme realized that the second dynamo was functioning as a motor with current supplied from the first dynamo. Fundamentally an electric motor is a dynamo in reverse. With this discovery began the extensive modern use of the electric motor for industrial and domestic purposes.

In 1885 Doctor Elihu Thomson worked out the process of electric welding, and thus began the great welding industry. While lecturing at the Franklin Institute in Philadelphia, he noticed in one of his experiments that the wires of a spark coil had been welded by the discharge of a heavy current.

In 1891 E. G. Acheson accidentally discovered carborundum, a new substance now widely used as an abrasive. Acheson was attempting to pro-

duce artificial diamonds in a furnace, using high temperatures and sand, with ground coke for a charge. The new substance is a salicide of carbon. Later Acheson discovered graphite, while still pursuing the search for artificial diamonds. One day Acheson actually produced minute diamonds, but he overheated the furnaces and noted a black substance with a greasy surface. It was graphite.

In 1856 Henry Bessemer discovered the process, which now bears his name, of manufacturing steel. One day he noticed that some iron did not melt because the outer part contained less carbon, and he realized that the air and flame had burned some or all of the carbon from the outside of the iron. To burn out all the carbon he tried blowing air into the molten iron, and he found that all that was necessary to turn iron into molten steel was a steady flow of air, the cheapest fuel in the world. This was an epoch-making discovery. Bessemer became the father of the steel age. Without his discovery there might be no railroads, no sky-scrapers, no great bridges, no ocean liners, and no great machines, in fact, there might be no industrial world as we know it today.

In 1856, George A. Bissell hit upon the idea of drilling for oil in the same way that water wells are drilled. It was an obvious idea, but an accident caused Bissell to think of it. To escape the scorching heat of a summer day Bissell sought refuge under the awning of a drug store. His eye fell upon a showbill advertising a medicinal petroleum. The bill showed a picture of a derrick used to drill the deep salt wells from which the medicinal oil was obtained. The idea of drilling salt wells was an old one, but the idea of drilling for oil was new.

It would be possible to go on endlessly reviewing known cases of discoveries made through accident. But we have given enough instances here to indicate the chance character of discoveries and inventions. Even those inventions which are seemingly the result of deliberate and direct effort on the part of an inventor, when analyzed, resolve themselves into a series of accidental observations by one or a number of observers. Most inventions are growths consisting of a series of steps. The development of the circular saw is an example in point. Such a saw may appear now as an obvious product, but nevertheless many other

inventions were necessary before this form of cutting tool could be achieved. To begin with, a straight saw was a necessary forerunner, with its tooth cutting action. A hard metal was a requisite, and the principle of the wheel had to be clearly in mind, and, finally, the concept of a revolving tool harnessed to some form of power, such as a flow of water, steam, etc., had to be understood before a synthesis of all these could be made into a circular saw. All these seem apparent to us now, yet it is barely one hundred years since the first circular saws appeared.

One of the astonishing aspects of all inventions is their obviousness—that is, of course, after they have been revealed, and one wonders why they were not thought of before. This is a very common experience. The rapid rate at which inventions are being made today is another phase of human development that must attract the students of contemporary history. For every invention made one hundred years ago there are today a thousand. The patent office in this country announces that there are 67,000 patent applications annually.[1]

[1] *Annual Report of the Secretary of Commerce*, 1939.

The complexity of modern technique places men in contact with a multitude of new situations, all of which reveal a multitude of opportunities for improvements and new methods of accomplishment. The most that men can do is to be on the alert for the new. Equipped as man is today with many instruments with which he can delve into the realities of this world he will inevitably come across new facts which in turn will reveal still newer facts. All around us are unknown phenomena which some day, perhaps, will be revealed to us. Edison once remarked that "there are many things occurring all around us which we will never know, because the human is limited by his five senses. If we could acquire another sense or two, new realities would be unveiled."

All our senses are points of contact with the external world. As previously pointed out each one of our five senses may be reduced to the fundamental sense of touch or contact. Contact is the essential for any change. This applies to the inorganic as well as the organic world. The action of air and moisture upon rocks of the earth is an extremely slow process, but we all know that a change takes place, however slowly. The

most indestructible of materials which seemingly undergo no change are none the less being gradually transformed. Even the so-called unchanging chemical elements are undergoing transformation, according to physicists and chemists.

Nothing stands still, everything flows, with a continuous crossing and recrossing of component elements within and without the organisms. The instant of crossing we are designating here as the moment of contact. If in the moment of contact a change occurs in the relationship of the component elements, either in the forming of a new combination or the dissolution of an old one, a step in the evolutionary process may be said to have taken place. In most cases, immediately upon a contact a change begins. Physicists inform us that the collision of electrons is responsible for interatomic changes, and it is the different rates of speed at which changes take place that cause misunderstandings. They appear to be more rapid in the case of organic matter than in inorganic. That chance contacts occur is not a violation of the law of cause and effect. A contact results immediately in the setting up of some sort of interrelated action, occurring rapidly or

slowly, and thus continuity proceeds uninterrupted.

Above all, contact in the human world is the beginning of invention. The technician at work in his laboratory, constantly in contact with materials and devices, soon finds desirable changes. Changes, no matter how slight, soon accumulate into worthwhile improvements. Some philosophers have defined contact as merely a step in continuity, but it is much more than that. The true significance of contact in a world of constant contacts has yet to be understood.

It is not within the capacity of man to conceive of an entirely new idea—one never before known. The idea must be suggested by some circumstance. The hint may be ever so meagre, but it must be there before the critical faculties of the mind can dwell upon it and enlarge it for ultimate use. The process of invention is a slow and gradual process. There can be no great jumps. The savage could not have invented the electric light. Frequently when the same conditions prevail the same invention is developed by several workers working separately and independently. Each worker happens to be in contact with the same conditions and

obviously makes the same observations. Bell and Gray filed patent applications for the telephone within a few hours of each other.

But even where a definite need is recognized for an improvement, there can be no assurance of the realization of such an improvement. Needs are increasing rapidly as civilization becomes more complex, but they will be satisfied only after a particular circumstance reveals a solution of the problem to some alert individual prepared to recognize the solution when he sees it. The old classic formula that "necessity is the mother of invention" is not true. There is great necessity for many things, but the necessity, of itself, does not bring about the invention. The reverse is usually the case. After an invention has occurred a great need and demand for its particular benefit are experienced. This has occurred many times. One does not crave that which one knows nothing about. To know about something is to invite its possession. The phonograph or the radio were not craved before their invention, but since their development they have become household necessities.

CHAPTER III

Philosophical Implications

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So that there may be no misunderstanding our premise, we repeat that we are engaged in proving that a material circumstance has been responsible for the extension of the ape mind, that the club, by becoming the early man-like creature's constant companion, became also his greatest teacher and builder. We are engaged in proving that it is owing to the club that the early ancestor learned, not only to walk like a man, but also to think like a man, and that civilization itself began with the club which was the first invention and the first tool of production.

In the light of the facts brought out in the preceding chapters we can come to only one conclusion—that the whole of human development has been a series of accidental occurrences, not disconnected or haphazard, but rather a gradual evolutionary process, where one invention leads to another and ultimately unfolds into a cluster of inventions, all adding to the store of human knowledge and having their retroactive and stim-

ulating effect upon the mind of man. Viewing human development in this manner, it is apparent that the phenomenon of inventions is a continuation of the biological process of variation and adaptation. As already indicated all inventions are but extensions of man's normal capacities. A hammer is an extension of his arm, a telescope the extension of his eye, an automobile an extension of his normal powers of locomotion, etc. Human inventions are the counterpart of the modifications of structure by which living species have been produced, and there is a complete analogy between inventions and organic adaptations.

Civilized man is only a primitive man with a larger brain. In primitive man we view civilized man stripped of only his larger mental capacity; in all other respects they are the same. The use of tools over an immense period has developed new nerves and new brain fissures. From an evolutionary standpoint those primitives that developed variations in the direction of better nerves and brain cells survived, and those that did not were destroyed. Those primitives who were first able to recognize the value of the club naturally had an advantage over their more animal-like kind.

Religion, art, ethics, sciences, in fact all the acquisitions of civilized man were developed by brains made capable of considering such abstract matters by the educative effect of tools, since the use of tools causes the brain to grow. The complexity of tools and the capacity of the brain grow apace. Every major invention has opened up new avenues of accomplishment, which in turn have stimulated new mental capacity. The invention of the printing press, for instance, made education universal, the knowledge thus disseminated producing a host of scholars. The intellectual attainments of the humblest worker today exceed by far those of the scholars of antiquity.

To see civilized man in his simplest terms we have but to contemplate primitive man. In his effort to survive in his primitive environment he underwent the same difficulties the modern man does, except that he was less equipped with inventions. The mental processes he used were exactly the same as those of civilized man, except lesser in degree. The modern scientist seeking to solve some complicated problem, such as how to prevent the spread of infectious bacteria, uses the same mental processes as the primitive man

used in solving perhaps a more simple problem, such as how to catch more fish for his needs.

Behaviour studies of apes by numerous observers confirm the conclusion that the use of a stick to accomplish its ends is a natural act in the life of an ape. In many tests, it has been shown that advantages obtained by using a stick, accidentally discovered by an ape, were remembered and subsequently used again. The ape uses his knowledge, limited as it is, to solve his problem, and likewise modern man uses his more extensive reservoir of knowledge to meet his needs. Most inventions are the fruits of the application of a known principle to the solution of a particular problem. The great inventions, however, are those in which a new principle, always accidentally discovered, is applied to solve an old want or develop new wants. The discovery of the X-ray, for instance, satisfied a long felt want and in turn opened up new avenues of investigation and medical research.

It has been observed long ago that consciousness is not a permanent part of the universe, but a transitory accident on a small planet on which life must ultimately become impossible; what is

called chance is, in fact, but the regular order of nature; things are not the outcome of any intelligent or orderly process, but of the law, the workings of which result in things being just so —neither good nor bad, neither orderly nor disorderly.

We have shown the nature of human development beginning with the first human invention, the club, and continuing down to the present day of civilized man with his great mass of intricate machinery of production, giving increased leverage to his otherwise insignificant bodily powers. We have indicated the manner in which the feeble mentality of the anthropomorphous ape has been magnified to the point where modern man has come to know nature's forces and has a powerful grip on those forces. Now for completeness and continuity, to determine if the mentality of all organisms is due to the operation of the same principle, we must investigate the so-called mentality of the lower organisms, such as the amoeba, and that of other forms in the evolutionary scale, to the prehuman mammal species.

It is known that the amoeba possesses within its single cell all the essentials of the more highly

evolved organisms, not excepting man. It contains all the elements of the more highly evolved sensory organisms, and, not unlike them, derives its sustenance from the surrounding medium. Jacques Loeb, made an interesting experiment in which he offered the Anemone (Actinia Equina) mixed particles of crab meat and pulpy paper. "The Anemone allowed particles of the crab meat to slide upon its mouth, the sphincter muscle was relaxed, and the meat digested, while the bits of pulpy paper evoked no response whatever from the organism."

In distinguishing between the paper and the crab meat the organism has certainly made a choice. And such being the case, the usual conclusion is that the amoeba possesses a mind, that this selective activity of the amoeba is due to "the working of mind." This was not Loeb's opinion. In its struggle for food, the creature reached out in the surrounding medium, made a contact with both the meat and the paper, and reacted in accordance with the stimuli received. It absorbs food and rejects automatically anything that is not food even though it may resemble food. It

allows crab meat to slide upon its mouth, while bits of paper evoke no response whatever.

Plainly, the modern problem is, in the first instance, what particular "stimulus" was responsible, for man's greater knowledge, for his selective and adaptational powers. Our idea is that the thought-process of man may be resolved to physico-chemical activity, and in a similar manner, as in the case of lower organisms; that this activity is the same in kind and different only in degree, as Darwin saw it; that the gap between the thought of the amoeba and the advanced thinking of civilized man is only a period of development and elaboration of the fundamental physico-chemical action of the simplest of living forms.

The similarity of the thought-process in the human organism with the physico-chemical activity of the lower organisms has been difficult, if not impossible, to analyze, because we have never had a theory of knowledge based on a physical principle. If we assume, as all previous theories have, that mind, or consciousness, appeared ex-nihilo, we immediately destroy for ourselves the opportunity of explaining the thought-process on the basis of science. All the evidence at our

disposal, which is extensive at this late date, is overwhelmingly in favor of the viewpoint that the so-called mind, no matter where observed, is not even an "accompaniment", as some are in the habit of seeing mind, but the adaptational and physical functioning of the neuro-muscular mechanisms.

The comparative activity of man, although greatly augmented by his knowledge, is the operation of that same mechanical selective activity found in the lower organisms. This comparative activity is in reality a natural selective activity and cannot be explained on the basis of will or reason. We are all agreed that lower organisms do not think out their actions, but we seem unable to carry that through, and we disagree as to higher organisms, especially man.

To distinguish between stimuli, and to respond in accordance with stimuli, is the fundamental action of the most highly evolved organisms, and constitutes their "mind". The lowest living organism, within the limits of its evolved neuro-muscular apparatus, makes such distinction and response, and man does the same in a much higher degree. The evolution of man from the lower

status has been largely an evolution of a neuro-muscular or sensory mechanism for responding to stimuli and being able to distinguish between stimuli. This is in conformity with the law of the survival of the fittest, since the greater the selective capacity of an organism the greater its adaptability to environment. A variation in the direction of a more sensitive selective organism would be an advantage toward greater adaptability.

Charles Hubbard Judd states, "A study of the lowest animal form reveals that they exhibit a characteristic which we call sensitivity. If one of the unicellular forms encounters food, if it passes out of a dimly lighted area into a brightly lighted area, if the surrounding temperature changes, there is set up within the protoplasmic mass an agitation which constitutes the animal's reaction to external stimulus. The higher animals are more responsive to different kinds of stimulation because they have organs which respond vigorously to different kinds of stimulations. The processes of evolution through which these special organs of sense have been produced and selected are similar to the processes by which all the organs of the higher animals have gradually evolved from

the unicellular forms of animal life. In general terms it may be said that certain cells on the surface of the body gradually become differentiated so as to respond to a number of particular stimuli. The surface of the body of all animals is, from the first, sensitive to contacts, to heat and cold very much as our skin is. Differentiation has taken place in the course of evolution resulting in specialized senses of taste, smell, hearing, and vision. The central nervous system of an animal's body serves a purpose additional to the integration of the body. It becomes a center for the retention of traces of past action. Such traces are preserved and turned to the animal's advantage. We do not know exactly the way in which this process of retaining traces of past experience goes on. Some change in the minute molecular arrangement of nerve cells undoubtedly occurs. We know also that the central nervous system has certain patterns which are transmitted from generation to generation in the same way that the pattern of the human hand and the pattern of human features are transmitted. Man has a large cerebrum in which impressions are rearranged and recombined. The cerebrum is an assemblage of nerve cells in a highly complex

organ. This organ is so related to the other parts of the nervous system that it exhibits unique functions. It is an integrating organ of the highest importance. It is an organ of individual adaptations, or of variable adaptations." [1]

To choose between two or more things is the sum-total of the capacity of animal or human mind, and this capacity is not of mind but of the senses and mechanical leverages; indeed, we find that the latest tendency in science and philosophy is to break away from mind as a means of explaining anything, and to dwell more on senses, which, as has been shown, can be reduced to one sense —the sense of touch. In the case of the evolution of the club into a mace, primitive man had no alternative but to make a choice in favor of the mace, since its shape gave an added power to the blow, as compared to the blow with a straight club. The use of the club itself by the anthropoid ape was a matter of compulsion rather than choice. Once having experienced the added power that the club gave to his arm, there was no alternative but to keep on using it, just as there is no alterna-

[1] Charles Hubbard Judd, *Nature of the World and of Man,* (Chicago: University of Chicago Press, 1926).

tive with us now whether we will or will not use an improved instrument. That's all any invention is—a mechanical leverage giving added power, not devised, made, or thought out, but discovered.

Animals are to be found in areas where food is obtainable, and in their struggle for sustenance they migrate to areas with greater food supply. Animals thus distinguish between food areas and non-food areas, and in so doing exercise what may be termed a comparative faculty; that is, they make a choice. Still in the last analysis, it is not so much a matter of choice as of compulsion, since for survival the animals must seek areas of food supply.

One can clearly see the similarity of the evolutionary process in man and the evolutionary process in the lower organisms when one realizes that both man and the lower organisms evolve by means of adaptational leverages. Favorable variations are the adaptational leverages for the lower organisms, and inventions, as we have shown, are the adaptational leverages in the case of man. To think is to function with one's adaptational powers. The lower organisms think according to their adaptational powers and man according to his.

Since man has superior and more numerous adaptational powers, his thinking is more powerful, but no more optional than breathing is optional.

When one speaks of conscious choice one speaks of the inevitable tendency of the living organism to select that which will serve to give it a mechanical leverage, all of which, as it seems, can be reduced still further. We may say that gravity is operating here as much as it does in the case of water running down hill. Or still better, let us compare the selective organism of the animal or of the human to a balanced weighing instrument. When a quantity is placed at each end of the instrument, the end with the heaviest quantity sinks to a lower level. The instrument has in a true sense made a choice in favor of the quantity with the greatest weight. Gravity has determined the choice, and likewise gravity determines the choice made by any selective organism whether found in the lower forms of life or in the most highly evolved form known—ourselves. What is thinking, even of the most abstract sort, if not but a sifting of evidence and balancing of data? There is no alternative—water must choose to run down hill and man and the animals must take

advantage of leverages for survival. Fundamentally the choice in the case of man, and the animals, and the choice that water makes when it runs down hill is the same.

Quite naturally the reduction of this whole proposal involves the disposal of the old philosophical argument as to quantity and quality. We compare numbers, number one the unit, with all other numbers, each number representing always a quantity of something. Surely the simplest and most original form of mathematics, arithmetic, exists because quantity, not quality, exists. The object of philosophy is to reduce quality to quantity. In measuring the attraction between given bodies we measure the bulk and density of those bodies. The greater the body the greater the attraction it exerts upon other bodies. Given the choice between two portions, a small one and a large one, everything else being equal, man and the animals will invariably choose the large portion, inasmuch as it brings with it the greater advantage. Making a selection is always quantitative. When we speak of a qualitative analysis, we really speak of a quantitative analysis inasmuch as a better quality means always a better

and higher proportion of quantitative considerations. Comparing two fabrics, for instance, we choose the fabric with the better weave, the more pleasing color, the cheaper price, all of which considerations are primarily quantitative and only thus have their appeal to the selector.

There is a vast difference, of course, between the selective organism of the lower forms of life and that of the more highly evolved organisms, but the difference is only in degree, the more highly evolved forms having a more complex and more sensitive selective organism. It lies in the numerous and intricate nerves, ganglia, stimuli receptive, and stimuli responsive components, in the more highly evolved sensitive organisms. Ascending the scale of the evolution of the living forms we come finally to man—the most highly evolved form because he possesses the most highly evolved selective organism and is able because of that to make very fine distinctions. The finer the distinction, the more sensitive or more selective the organism must be.

The capacity of man to make finer distinctions or comparisons is the basis of his consciousness or the so-called knowledge of self. It is not likely

that the lower organisms are aware of their own existence. Man, however, is conscious of himself, and is so largely because of his knowledge of the world through inventions. An animal, such as a dog or a cat, may see a reflection of itself in a mirror but has no equipment to make a satisfactory comparison and is therefore inclined to look upon its reflection as an enemy or a playmate. The greater our knowledge of the world the greater is our knowledge of self; it begins there and it is through our knowledge of the world surrounding us that we know ourselves. The whole process of evolution of the living organism has been in the direction of a greater susceptibility to external phenomena. A variation in the direction of a more sensitive selective capacity would be equivalent to a greater leverage or increased power, permitting of a greater adaptability.

In the case of man, sensitivity will necessarily vary with the individual. The greater the range of sensitivity, the more highly evolved the selective mechanism of the individual. The average individual possesses an average range of sensitivity, but occasionally we find an individual possessing a special sensitivity in a special direction, such as

in the case of a musician, whose sensitivity is specialized or predominant in the direction of sound or tone responsiveness.

The ape pounding the ground with his stick to hear the sound is far removed from the gifted violinist who vibrates the strings of his violin with a bow and produces exquisite music, yet the difference in the mental processes is only a difference of degree. Just as the stick educated the ape, producing in time new nerves and new brain cells, so the use of musical instruments, perhaps very crude in the beginning, has gradually produced new nerves and new brain cells capable of enjoying more complex musical forms.

With the invention of new and improved instruments of tone production, a constantly accumulating knowledge and means of musical expression are at the disposal of the musician. These act as new stimuli, and the cumulative effect of them extending over many generations results in the evolution of a higher tone responsive mechanism. Add to this the general stimulus of human progress in other fields and we see the unfolding of the musical genius, all the result of the evolution of

the selective mechanism acquired from the lower organisms, plus the phenomena of a series of inventions beginning with the most primitive instruments like the tom-tom and extending down to the invention of the modern grand piano and the complicated instruments of the symphonic orchestra. Coupled with this there may be other contributory factors making for the evolution of a full fledged musician, such as training and general environment, which, if favorable, would tend toward the production of a musical genius.

To sum up the evolution of the musical genius is to find an inherited sensitivity to sound and tone, plus variation in the direction of a still greater sensitivity to sound and tone, plus special circumstances and favorable environment, such as opportunity to express the natural tone responsiveness, education, etc. Given a great emotional experience, a great happiness or sorrow, as a stimulant, and the composition of a symphony might result. We thus trace the evolution of a Beethoven. A similar process takes place in the evolution of any genius, whether painter, sculptor, literator, or other artist, or, for that matter, a business executive. This is but a skeleton outline but will serve

to indicate the fundamental steps in the evolution of the genius-individual.

We marvel that man should have so steadfastly pursued knowledge. The individual who seeks knowledge at all cost, is, of course, a highly evolved type and indicates the possession of an especially active selective organism. The tendency throughout the ages of human development must have been in the direction of elimination of the individual with a sluggish, selective organism, or sluggish mind. Competition, even between intellectuals of our social structure, is very keen. Pursuit of knowledge, while it may be a manifestation of a more highly evolved state of society, is not, however, devoid of the same struggle for existence which is apparent in the lower forms of life. The Darwinian struggles goes on unrelentingly even among the most highly evolved individuals of modern society, among the personnel of our highest institutions of learning.

The inventive man is one who is constantly on the alert for the unexpected. When the unexpected does occur, he is prepared to observe it, and attempts to explain it with the equipment and facilities at his command. Unusual and outstand-

ing inventors, like Edison, for example, are far in advance of normal individuals in their capacity for analysis and synthesis. They possess superior mental equipment just as certain apes are superior to others. The differences between apes, as well as between men, often depend upon such matters as a capacity for sustained effort, which resolves itself frequently into a matter of health. The stick gradually educated the ape, and the inventions of civilized man are likewise developing and educating mankind.

It has become impossible for anyone human to encompass all human learning because of the great quantity of accumulated knowledge, and we have therefore been forced into an age of specialization. Nevertheless, we are awed by the tremendous mental capacities of some individuals, such as actors and musicians who have at their command great repertoires of roles and musical scores. Technicians and professional men who are able to summon up instantly accumulated knowledge involving years of study and experience amaze the average man. Yet all these amazing performances are similar in kind to the meager mental efforts of the ape in behaviouristic studies. The ape

quickly tires when subjected to a mental test but after a rest is active again. The higher the type of man the longer is he able to struggle for a solution. We recall the French professor Champollian who persisted for twenty years before solving the meaning of the Egyptian characters on the famous Rosetta stone, which was the key which unlocked all the written records of Egypt.

Is there anything else in the process of thinking other than making a choice of some kind? It does not seem so, and no matter how involved a specific instance of thought may be or how intricate the mental process is, it is always a selective process. It has often been said that knowledge is comparative, and logic mathematical sequence. For instance, the reader who is reading this treatise is continuously making comparisons between the facts offered here and the facts which he has acquired from other sources. He weighs the evidence, the process being highly complex, of course, but fundamentally a selective process, and the reader chooses one way or another, depending upon the advantage to be gained. When a new scientific hypothesis is presented to the world there immediately ensues a debate concerning the

relative merits or demerits of the new hypothesis, and in the long run the hypothesis which is the most assimilable is selected. To do otherwise would be equivalent to self-destruction, and it is only through blindness and mis-education that we pursue a destructive course.

All the great philosophers have attempted to explain human progress by an explanation of the forces which motivate the human being. Reason, desire, will, *elan vital,* and various natural urges have been held responsible for the advance of man from savagery to civilization. But all the will and all the urges in the world combined cannot produce a new idea. A new idea comes to a human being because of a combination of circumstances—all of them accidental. The most that one can say of a strong will or a strong desire, is that the possessor is healthy and normal, and that his sense perceptions are keen, and that the individual thus equipped will recognize a new idea more readily than another less favorably equipped.

Man advances as his knowledge increases. This is fundamental. And those philosophers who gave their first consideration to epistemology, i. e.,

the origin, nature, and validity of knowledge, were on the right track.

Descartes, Leibonitz, Locke, Berkeley, Hume, in fact the whole list of philosophers, struggled with the problem of mind and to the extent that these classic philosophers clarified the problem of mind, must they be judged good or bad. Some philosophers, such as Hume, attacked the concept of mind, while others, such as Berkeley, destroyed matter, and between the two schools of thought seemingly nothing was left. Kant toiled over the problem of knowledge (how do we put sense and order into our sensations?).

Throughout the entire controversy a golden vein of clear understanding of the true nature of man and the world in which he lives is occasionally glimpsed. "Everyone believes himself *à-priori,*" says Schopenhauer, "to be perfectly free, even in his individual actions, and thinks that at every moment he can commence another manner of life, which just means that he can become another person. But *à-posteriori,* through experience, he finds to his astonishment that he is not free, but subjected to necessity, that in spite of all his resolutions and reflections he does not change

his conduct, and that from the beginning of his life to the end of it, he must carry out the very character which he himself condemns, and as it were, plays the part which he has undertaken, to the very end." [1] Elsewhere Schopenhauer says, "we do as we wish, but we wish as we must." Yet in spite of these lucid statements Schopenhauer writes a book, *The World as Will.* In the absence of a clear understanding of how men acquire knowledge, it is quite possible for even a first rate philosopher to arrive at an absurdity.

For centuries the battle between the philosophers has raged. On the one hand the hypothesis presented to us is that from the broadest aspects of human development down to the insignificant details of an individual's life, man's control is an illusion and on the other hand the hypothesis presented is that man completely determines his every action and ultimate destiny. Matter versus mind, flesh versus spirit, good versus evil, altruism versus egotism, and so on endlessly. And then again there are some who take a middle course and postulate that the des-

[1] Schopenhauer:—The Wisdom of Life.

tiny of man and of society are to some extent and within certain limits and to a partial degree subject to the conscious control of man. Little satisfaction can be derived from such a middle and dualistic course. Either man controls his destiny or he does not control it. Either he is, or is not a product of evolution. Thus must the proposition stand.

Karl Marx tried hard to identify himself with the materialists as opposed to the idealists. He concerned himself primarily with those forces which are not in the individual. He made a valiant attempt to evolve a scientific interpretation of history based upon the material forces of production and ascribed all human changes, even changes in ethics, to the changes in productive forces. But alas, Marx wound up with his "rule of reason", which would supplant "capitalistic necessity", and in so doing became just another dualist.

The debate among the philosophers has been caused primarily because there has been no clear understanding of the nature of man's higher intelligence. The materialists ascribe higher mentality to unknown material causes, and the idealists

ascribe it to non-existent psychic causes. We maintain here that the basis of man's higher intelligence is to be found in the early discovery and use of the club, that the connecting link between human intelligence and animal intelligence lies in the club, that the cause was an environmental, extraneous, and accidental cause.

The progenitor of civilized man was an arboreal dweller. The arboreal environment of our ancestors resulted in a definite structural evolution of his body in the direction of a being with long forelegs and great prehensile capacity of his hands and feet, such as are observed in all known apes. In the course of time it was inevitable, that this tree-dwelling creature, constantly in contact with the limbs of trees should make the discovery that he could manipulate a stick. With the formation of a flexible, prehensile organ—hand, originally a foreleg, such a discovery was biologically inevitable. All subsequent inventions and discoveries have been an extension of this process. To this day man wields many sticks in the form of machines and an infinite number of aids to existence. The bridge between the animal ancestor with "instinct" and the civilized man with "think-

ing" is to be sought in tools. The greatest event in man's entire history was the use of a branch of a tree as a club; the wonders of the human mind begin from that event; and the civilized man is where he is today, with his mentality magnified a thousand fold over the original feeble animal mentality, solely because of that event.

CHAPTER IV

Sociological Implications

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SOCIOLOGICAL IMPLICATIONS

IT HAS been truthfully stated by many authorities that social science is non-existent. Medicine, chemistry, physics, and other branches of learning have been placed on a sound scientific footing and tremendous strides have been made in these fields, but in the social and political fields we are still in a pre-scientific era. The absence of scientific sociology has been due entirely to the absence of a clear understanding of the nature of man's evolution and specifically to a lack of understanding of how man acquires the knowledge that makes his advance possible.

Both ancient and modern thinkers have approached the subject of man's society with the preconceived notion that man is an entity apart from nature and not subject to natural laws. Man has been considered as transcending natural law and not a creature of environment like the animals. The assumption is that man can make his own

laws, can control nature, and can create for himself a world apart from the natural world, and today this view persists stronger than ever. That man is a creator is the essence of the prevailing philosophy and sociology.

We have shown in the preceding pages that man is not a creator—that he adapts himself to his environment in the same manner as the animal does. We have surveyed the chief problem of philosophy—how man acquires knowledge—and have determined that man has risen from savagery by means of a series of inventions and discoveries all of which were accidental, and that this process is a continuation of the process of accidental differentiation and adaptation occurring in the animal world. Sociologists have endowed man with superhuman creative powers which he completely lacks. As we view the world of man today we are appalled at the spectacle presented. If man is a creator, then of course he can make his own society, and that is exactly what is being attempted the world over. Men are remaking the world instead of adjusting themselves to it, and there is nothing so devastating to human society as the attempts to remake it.

The chief offenders in these efforts to remake the world are the socialists of the school of Karl Marx. Says Achille Loria, a Marxian critic, "The socialism that inspires hopes and fears today is of the school of Marx. No one is seriously apprehensive of any other so-called socialistic movement and no one is seriously concerned to criticise or refute the doctrines set forth by any other school of socialists." It is Marx who made over Utopian Socialism into Scientific Socialism, and he who created the "Kingdom of Reason." It is his doctrine that reigns in the heart of every revolutionist.

Marx starts out with the scientific premise that changes in tools of production, and not reason, is the cause of changes in society; and then he nullifies this position by stating that reason is responsible for changes in tools of production themselves. He overlooked the very important point that the application of reason is not the explanation of the development of tools, and because he overlooked this fact he came to write a very faulty, very fantastic, and unscientific theory. It is for this reason that he inevitably came to the conclusion that "men make their own history" or, as others put it, "transform their envir-

onment". By maintaining that the application of reason, or the so-called creative capacity of man, is the cause of changes in tools, Marx distinctly breaks the continuity of evolution and fails lamentably to produce the necessary determinant for changes in productive forces. The Marxian law of social progress is not the law. Marxism is at best only a half-science, that very same half-science which Dostoyevsky characterizes as worse than total ignorance, "An appalling scourge, worse than famine, pestilence, and war". This, it may be remarked, certainly sounds like prophecy.

Some economists have attempted to explain the evolution of productive forces by necessity. There is a necessity to improve tools so we simply go ahead and improve them. We have already shown that this is not true. Necessity does not produce inventions. The need for improvements or a new machine may exist, but necessity for it will not produce the required invention. Furthermore, we have a necessity only for that which is already known. Who can feel a necessity for something unknown? Other economists endeavor to explain the evolution of productive forces by population. Productive forces develop and grow

in efficiency because population grows. This, however, is only another way of saying necessity.

Another explanation of the evolution of productive forces is geography. Plehanoff states that "the causes of changes in productive forces is geographical environment." Of course, no one can get away from geography; it is everywhere like the atmosphere. Therefore it seems a very handy explanation. Nevertheless, how are we to explain an actual case, for example the metamorphosis of the bow and arrow into a shotgun, by geographical environment? In any geographical environment men had to have tools to fight and work. Man is a tool-using and tool-making animal in all geographical environments.

Mutual aid is another explanation for human evolution. That mutual aid is the instinct that accounts for progress, is the contention of many social minded individuals anxious to right the wrongs of this world. Mutual aid may look very important in the hands of such a master as Peter Krapotkin, and important it is in this world. But, mutual aid, important as it is, is not the fundamental law of nature. A hungry, starving crow, to use Krapotkin's own example, will not feed the

sick crow, but rather eat the sick crow. There used to be much mutual aid in Russia. Russian hospitality was proverbial when Russia had plenty, but now when a Russian sits down to eat he locks the doors and pulls down the blinds. The doctrine of right has gone, and the great principle of mutual aid has gone and will not return until there is enough food to go round and a little more to spare. Mutual aid comes from abundance, and that in the human world comes from industry.

Mutual aid and its many forms, including charity, emanates from the surplus produced by industry, and the basis of industry is invention. Charity is a noble virtue, but to be charitable presupposes the possession of a surplus. Without having more than we can use, there can be no program of charity. Likewise liberty is not a free gift given by man to man. Freedom and liberty begin with industry, which in turn depends upon invention. If one can press a button and have light and power —that is freedom. If the housewife can use a dishwasher or a washing machine—that is freedom. Women's place in the social structure has undergone a noticeable transformation in less than a generation and is due primarily to the liberating

effect of labor saving devices in the home. The struggle between the north and south in the Civil War was not a crusade of righteous northerners wanting to free the negro, but rather the accumulated effect of an economic struggle between the slave labor of the south and the machine of the north. It is the machine that is abolishing inhumanity and slavery. Prior to the machine no one could have advocated the abolition of chattel slavery. The ancients took slavery as a matter of course. Ethical considerations for the abolition of slavery were impossible in the older world. The ideal of freedom for the slave was a reflection of a deeper economic force—the substitution for hand power of machine power, which is this same evolutionary process of variation and adaptation in the world of man which we recognize as the phenomenon of invention.

This same force will ultimately liberate man from the drudgeries of life, but this will not happen over night. Evolution is a gradual and slow process. Those liberals who would usher in the day of liberation, by a sudden *coup* are only destroying themselves. There are no short cuts to economic affluence or opulence. Revolution

only stops the normal progress of man and turns back the clock of civilization.

A stoker, working below decks in frightful heat, is the pitiful slave of machinery below and wealth and luxury above. But invention will ultimately free him also. Automatic stoking machinery is being perfected, and soon a man sweating in the hold of a ship will be as out-dated as chattel slavery. But even so, the lot of the stoker is far better than that of his predecessor, the galley slave, chained to the oar below the fighting deck of a Roman galley. He pulled the heavy oar to the cracking of a whip that cut his flesh. If he fainted, his hand was cut free at the wrist from the chain that fastened it to the oar with a blow of the overseer's sword. Another slave was chained in his place and he thrown overboard that the rhythm of the oars might not be interrupted. The galley slave himself was machinery—his muscle supplied the power—whereas the slave in the stokehold only feeds the machinery. That, too, is improvement brought about by invention.

The whole of our present social science breathes revolution. It is permeated with writers, preachers, and statesmen who vie with each other in

radicalism. Industry and commerce are looked upon, not as the life blood of the nation, but as intolerable institutions in which avaricious plutocrats grind down the working classes. That these institutions are basic to human existence is not generally appreciated. It may have taken thousands of years to develop a system of exchange. "An animal is utterly unable to rise to the level of purchasing and selling." The use of money and other devices for exchange, such as weights and measures, did not come suddenly to primitive savages. "Even the most primitive barter was a very useful method of providing for social cooperation, and, once it was instituted, it supplied a method of adaptation so advantageous that the human race has elaborated exchange until it has become one of the most important of human activities." [1]

The Marxian contention that capitalism is but a temporary form of society is highly erroneous. The inference is that there have been other forms of human society, and that there will be still another future form. This is not the case. There is only one continuous human social system. True,

[1] Charles Hubbard Judd, *Nature of the World and of Man,* (Chicago: University of Chicago Press, 1926).

the outward aspects of primitive society and civilized society are different, but the same forces that operated in primitive society are also operating in civilized society. The forms of social intercourse, trade, commerce, and industry are different in extent only in primitive and civilized society, and in either case the process of evolution operates in the same way. The inventions of primitive man were simple while those of civilized man are more complex. Civilized man is only primitive man grown up, and the same applies to his society. The nomenclature used by historians to define various stages of human development, such as feudalism, and especially Marx's coinage of the name capitalism for the so-called modern "profit system", has been very misleading. The suggestion is that these stages were distinct new forms, whereas they are only aspects of the same system. When Marx turned to forecasting the socialist state of the future, he predicted that the proletariat, hitherto ground down by blind economic forces, was finally to master economics for itself and to control the forces which had formerly mastered it. By such a prediction Marx has misled millions of people and precipitated a world wide

situation that will take generations to adjust and rectify.

All attempts to interfere with the fundamental processes of human evolution can only result in disaster. As never before in the history of man, the natural system of human society which is termed capitalism needs a defense. Enterprise, thrift, property ownership, and other natural qualifications for a healthy community that have been essential in the past are being condemned and displaced. Besides communistic movements sponsored by disciples of Marx, there are other subversive movements prevalent throughout the world, all seeking to substitute artificial expedients for the normal and natural processes of human society. It speaks well for the inherent vitality and recuperative powers of capitalism that it has been able to withstand, thus far at least, these attacks upon it. There is no assurance, however, that this immunity of the social body against destructive social diseases may not ultimately be weakened or broken down entirely, leaving ruin in its wake. There have been many critical periods in history when the social body received severe blows in the form of revolutions that laid it waste,

but fortunately the normal evolutionary processes of society were not destroyed entirely, and after periods of convalescence the normal processes of society were reestablished.

There have been high peak periods in human history when trade and commerce were brisk and the industries and arts flourished. During these periods inventions were numerous, and much can be learned of the natural processes of human society by a study of these periods. Two such periods were the Periclean era in Greek history and the Italian Renaissance. During both these periods, as well as in similar periods, enterprise was fostered and the competitive spirit was glorified. Our own American history is a similar period of development. Favorable conditions plus an enthusiasm for free enterprise have culminated in a mighty and progressive nation.

For the greatest development of man, a free and unrestricted field of opportunity must prevail. Under such conditions industry and the arts flourish and inventions occur frequently. As we have pointed out, the phenomenon of invention is an accidental occurrence brought about by a combination of favorable circumstances, beginning with

a simple contact and culminating in a recognition by man of advantageous results to be gained by the combination revealed by the contact. We may draw an analogy between such conditions and the situation which exists in nature when soil, water, and mineral ingredients are favorable for the germination of a seed. With the increasing complexity of civilization the contacts are increased, with the result that the number of inventions is increasing with great rapidity. Rapid means of communication and the many facilities for dissemination of information make available new findings for the use of all. In man's early history there were immense periods of time between inventions, while in our own day the rate at which new inventions are occurring is cause for wonder.

Dr. W. R. Whitney, in the *Scientific Monthly*, writes "We are told that if the total age of mankind be expressed as the life of a man of fifty years and if he then looks back upon his progress he will see that what marks his greatest advancement are events occurring in the most recent years. For example, such a fifty year man now sees that he had not learned to scratch the simplest records on stone until his forty-ninth year. All the im-

mense advantages of printing have only existed three months for him. He has only just learned how to pass along what he has learned. The uses of steam, which now seem so necessary, were acquired only three or four years ago. The uses of electricity (street cars, lamps and telephones), which did not actually begin until about 1880, arrived the day before yesterday to this fifty year mankind. The automobile, wireless, X-rays, radium and most of the things which occupy our interest today, were actually discovered on this particular fiftieth birthday." [1]

The effect of a single invention on human society is at times very extensive. Buckle, in his famous *History of Civilization in England,*[2] describes the effect of the invention of gunpowder. The invention of gunpowder in the thirteenth century laid the foundation for a great change. Before the invention of gunpowder standing armies were entirely unknown. Before this time every citizen was a member of the militia, always ready for battle, and peaceful pursuits were generally despised. The whole of Europe composed

[1] Scientific Monthly, June, 1924.

[2] Buckle, H. T., *History of Civilization in England,* vol. 1, pp. 146-50.

one great army in which all other professions were merged, with the possible exception of the ecclesiastical profession, although it was not uncommon to see troops led to battle by bishops and abbots. The only avocations were war or theology. But the use of gunpowder changed all this. The increased complexity of the military art and the increased cost of weapons made it necessary to train bodies of men for the sole purpose of war, and for the first time standing armies separate from normal employment were organized. With the increased efficiency of armies a smaller number of soldiers were sufficient and a broad division between soldier and civilian was established, leaving a large part of the population for the cultivation of the arts of peace which had formerly been neglected. With each succeeding generation a clearer division was recognized between normal pursuits and military service, checking the previous superstitions, feelings, and affection for war. The invention of gunpowder, a warlike improvement, diminished the warlike spirit by diminishing the number of persons to whom the practice of war was habitual. We thus observe the effect of an invention on the morals and intellect of the race.

The effect of the invention of steel on human society is incalculable. Steel has completely altered the life of man. We can lump the whole cause of the modern age in one word—steel. It is to steel that we are yielding in our present age. Man yields—not steel. A new day is upon us and the chief reason for it is the invention of steel. What else is the modern cry in the industries and in the arts of man but an attempt to subdue and readjust old notions and ideas in order to meet the new turn of events caused by the direct and indirect influence of steel in our lives? A Goliath has grown up within our midst and is beckoning to us with a mighty gesture.

No other factor in modern history has contributed so much to the changing of human existence as the invention of steel. The railroads for instance depend wholly upon this material. In his *History of Invention,* Kaempffert, a well known authority on invention, writes, "Probably no other single influence was so effective in reducing the cost of transportation and improving the general condition of the railroads as the substitution of steel for iron rails. It was the steel rail that brought the Western wheat growing

regions into direct competition with the agricultural industry of the East. The steel rail has been the principal factor in enabling the American railroad to populate the West by distributing the hordes that migrated from Europe".

It is an odd catechism that we have been reciting all these years, insisting that all the changes in the world of man have been due to original ideas conceived out of the minds of men, when all the while the materials and natural forces with which we have come in contact have been determining all our thoughts. The best that man can do is to conform to these conditions. We operate within the limitations of these conditions. Historians have been content to ascribe the evolution of culture to the impulses set up by religious or aesthetic movements, without concerning themselves with the material causes responsible for such movements. Similarly those who interpret history in terms of great men have ascribed social changes to the contributions of leaders, without concerning themselves with the effect that inventions have had upon them.

Steel, which arrived in practicable form with the discovery of Bessemer in 1856, was not an

effort by Bessemer to produce a new material which would change methods of construction or fill American cities with skyscrapers, but rather was the result of a chance observation by Bessemer which led to the present gigantic steel industry. Human thought has not dictated the forms of steel structures or machines; these have forced themselves into existence by the sheer strength of the physical realities of steel. We are compelled to use steel because of its superior physical composition and its extensive applicability.

The determining factor in the evolution of new materials and tools has not been "the creative capacity of human thought", but the presence of specific materials on the surface and in the bowels of the earth and the existence of various forms of energy discovered at different times. These have determined human progress. The most that the keenest intellect can do is to use these materials and forces logically and in accordance with their nature. Man works with these as he finds them, and as he discovers more facts concerning them the world changes. There is no royal road to the acquisition of this new knowledge; one cannot proceed toward it directly. Men must

work with existing forces and materials, and in the process of work knowledge increases. New patterns, new arrangements appear or are suggested. The alert and vigilant inventor quickly appreciates that which may prove satisfactory. He makes a conscious choice, of course, but his choice is a biological choice in that his organism of selection makes the most advantageous choice, that is to say, the most favorable choice quantitatively or qualitatively. A semblance of abstraction is apparent in the case of an inventor who plans and designs a machine, but in the last analysis the "ideal solution" or most satisfying design is the most advantageous arrangement of elements to fit the requirements, and the truest statement of the function of the machine as a whole and of its individual parts.

With the introduction of a new invention a variation of existing methods takes place. The history of invention is filled with the skeletons of rejected methods and technical processes which have outlived their usefulness and have perished in the path of new forms and technical processes. As in the world of living organisms, man included, there is a constant struggle between old and new

techniques, and only those survive which best meet the requirements of changing conditions.

We have thus reduced intellectual factors and the intellectual activity of the inventor to an adaptive process, and have deprived the inventor only of a fictitious creative capacity; in doing so we have paved the way for a clear understanding of the nature of human thought, and at the same time a comprehension of the true nature of man and his society.

By understanding the phenomena of inventions we see that the connecting link between the anthropoid ape and the first man was the stick, the first tool, the first implement of production. We see the stick and the club and all subsequent inventions as extensions of man's normal powers, and see in this process a continuation in the world of man of the same evolutionary process of accidental variation and adaptation occurring in the animal world. We see the origin of human thought in the unconscious evolutionary process. By understanding the phenomenon of invention we see the answer to the baffling and age-old philosophical problem of epistemology, and the path is also cleared toward a scientific sociology.

The same process which operated when man was on his haunches operates now when man can seemingly laugh at nature and fly like a bird. Consider inventions and you see at once the operation of the same evolutionary principle in this day of highly developed technique, as in that long past day when the ape-like creature, because of his stick, rose from his haunches, walked like a man, and began his new and glorious career.

CHAPTER V

Political Implications

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POLITICAL IMPLICATIONS

THE OBJECT of science is to reveal the world about us clearly, with a vision unblurred by false premises and assumptions. There is no force more productive of beneficial results than an idea based upon a sound principle, and nothing more stimulating than the application of such an idea. Likewise there is nothing so destructive as the application of an idea based upon a false premise. Most of the serious reverses in the history of mankind have been due to ignorance. Human understanding—that is to say, knowledge—may be of two kinds, correct understanding which is based upon conclusive evidence and satisfactory experience, and ignorant understanding which is based upon imperfect and inconclusive evidence. It is the function of science to clarify our knowledge and make its applications available, and as in all phases of human activity, a constant struggle is going on to prove

or disprove knowledge. The process of natural selection operates here as elsewhere in the world.

In the absence of science, men have relied for guidance upon myths, superstitions, and all manner of beliefs. But as inventions increase and the human thereby becomes better equipped to dissect and distinguish the world about him, these superstitions gradually disappear, and in their place appear well founded theories based upon solid foundations. It is the incomplete theories still in the process of formation that are perilous and likely to cause harm. It is well recognized by both the layman and the expert that "a little knowledge is a dangerous thing."

In the case of Marxism an incomplete thought has captured the imagination of men throughout the world, and a vast world wide movement has developed which threatens to disrupt the normal process of human development. Let there be no misconceptions regarding the extent of this movement. Every country in the world today harbors worshippers at the shrine of Marx. These followers have all the zeal of fanatics and are convinced that they have been given the light which shows the way to "a world bereft of the inequali-

ties and struggles of existing society". In addition to the millions who openly acclaim Marx there are also countless others who publicly disavow the Marxian doctrine but secretly await the day when individualistic capitalistic society may be displaced by a collective form of society. It would appear that man has the capacity to imagine himself in non-evolutionary settings, and the greatest of these impossible situations is the ideal of a perfect society where struggle has been displaced by a less rigorous force.

We contend that a scientific theory of human progress has been impossible without an evolutionary interpretation of the phenomenon of inventions, that in the absence of such an evolutionary interpretation economists and students of history have been floundering without a true base. The author of *Historic Materialism,* Karl Marx, was on the right track to an evolutionary theory of human society, but as has already been indicated, Marx swerved from evolution to revolution. Marx at least sensed the real cause and the real approach to an analysis of history when he introduced the subject of changes in productive forces as the starting point of his theory. He failed how-

ever, to see the true relation of inventions to changes in productive forces and therefore led his followers into a morass.

Equipped with a faulty foundation, it has been inevitable that the Marxists have arrived at faulty conclusions. Man cannot be the dual personality suggested by Marx: first a creature of environment, then a master of environment; first a product of unrelenting class war, then a member of classless society; first a national revolutionist, and then a member of an international brotherhood. Internationalism, it would appear, is to be the ultimate achievement of Marxism, but from an evolutionary point of view, such a result cannot be anticipated. The tendency in nature is not in the direction of unification or amalgamation but rather toward differentiation and diversification. This is readily observable if we review the history of peoples. New nations and new minorities are constantly in the process of formation throughout the world and this process of differentiation is going on within the confines of all countries. Even within the borders of our own country very marked differentiations are becoming noticeable in many sections of the country. In spite of improved means of

communication and dissemination of knowledge, differences in speech, habits, and customs are constantly on the increase and sectional and state lines are becoming more and more marked. This process may be a very slow and gradual process but cannot be interfered with or checked. Recent political trends have been in direct opposition to this natural process and the Federal Government has attempted to actually break down these natural state barriers. Such attempts are serious mistakes and are the result of a political philosophy which is based on non-evolutionary principles. A federal government that fails to recognize these accumulating differentiations must anticipate unwholesome consequences. Such a political philosophy, of course, has its origin in collectivistic doctrines promulgated by those who would tear down all barriers and deliver to us formless and sterile human relationships.

A non-evolutionary political philosophy gives rise to all sorts of hazardous attempts which have the effect of stemming the flow of life blood through the arteries of the social system. Federal control, instead of advancing human welfare, may retard it if those in power fail to understand the

forces that operate in human society. Trust-busting, excessive taxation, and interference with business and industry, in the many forms it has assumed in very recent years, are products of a political outlook which may be well intentioned but which is founded on ignorance of correct sociological principles.

The assumption that any business organization can grow to such proportions that it completely monopolizes all competition is not founded on fact. There is a definite limit to the size of any organization, beyond which it ceases to function efficiently, in the same way that any living organism achieves its maximum dimensions and scope. After the organism achieves its maximum practicable size, it disintegrates or divides into smaller components. There are many evidences in the natural world of the limitations of the growth of living organisms. Many species have perished because of excessive growth. The dinosaur is an example in point. The bones of this animal kept growing in size and weight to the point where its muscles were unable to efficiently operate its limbs and the animal readily became the prey of other species less handicapped.

Even before trust-busting became a political slogan, large organizations were beginning to break down into subsidiary companies and other smaller but more efficient nuclei. Centralization cannot proceed except to a certain point, after which decentralization must inevitably set in. The recent experience of the federal government is a proof of this. The various agencies of the federal government have become entirely too cumbersome and unwieldy to be able to function efficiently. The ramifications of the large bureaucracy at Washington and its agencies throughout the country can result only in a frustration and the ultimate stagnation of normal activity.

The underlying force in human society is individualistic, as it is in all forms of existence. The founders of the Republic wrought wisely when they founded the American constitution on individual initiative, individual ownership, individual home and family, and individual pursuit of happiness.

Collectivism is an abrogation of individual rights; there can be only one sound collectivistic effort and that is the protection of individual rights. That is the concern of all. The chief pur-

pose of government is the protection of individual rights. It must act solely as a guardian of individual rights and an arbiter to protect such rights. For government to go beyond this function is immediately to set up forces that are anti-individualistic and therefore anti-social. Planned economy may be a useful activity of government when it is limited to the protection of natural resources, but it becomes a vicious interference with healthy growth when government participates in business in competition with its members. When government plans the business of its individuals, it is disastrous both for the individuals and for the country. Instead of energy, daring, and eagerness we get apathy and the deadening hand of centralization and autocracy.

Any form or system of government must be judged principally by the manner in which it permits free play of inventive progress. Industry is the result of invention and that which helps invention helps industry and vice-versa. Unjust and over regulatory measures that stifle industry will naturally result in the slowing up of invention. Invention is the basis for all human acquisition from which all human benefits flow. Art, litera-

ture, music, and all human advancment, no matter in what field, rest and depend upon invention. Inventions have widened the sphere of man's horizon in every avenue. The gradual invention of language, extending over an age long period and still continuing today, the invention of the printing press and all its varied forms, and now the invention of the radio, have speeded up the approach to a day when human understanding and accomplishment shall surpass anything heretofore conceived.

The function of government, in its protection of individual rights, is to foster and protect industry and the natural resources of the country. It appears that the form that any government may assume is unimportant so long as it does not interfere with the natural evolutionary process. The law of natural selection operates with unerring accuracy in the world of man as in the world of lower organisms. It may be diverted temporarily but it must have its way ultimately. No state can by edict nullify or stay the inexorable law of nature. By means of inventions the evolutionary process of accidental variation and differentiation

operates in the world of man, and man is not exempt from natural law in the slightest degree.

A government that tampers with industry, even with the consent of the governed, is interfering with natural processes and with the liberties of all. Despite the well-meant professions of reformers, collectivism is not one of the imperatives of evolution. Nationalization of property is nationalization of poverty. Industry and liberty are inseparable. Liberty is not a matter of revolution, but like industry is a slow process of evolution growing out of inventions. Capitalism and communism are antithetic, mutually exclusive and cannot be mixed. Liberty begins and ends with capitalism, because industry is free under capitalism. Industry thrives under capitalism because capitalism is the natural medium for industry.

The industrialists are the key men of any country. Around these men revolve the fundamental activities of the nation. It is their status that determines the status of the country, and as they fare, so fare the people. It would be retrogressive to deprive these industrial leaders of their position in the nation, and substitute for these trained and experienced men less competent

authorities. A government which presumes to dictate the policies of industry by nullifying the natural processes of business must anticipate serious dislocations in a system which achieved its present existence only after a long and slow period of evolutionary growth. The natural forces in industry must be protected at all costs if we are to preserve civilization itself. It would appear from the history of recent legislation that incompetence rather than competence is being preserved. The feeble minded, the misfit, and the unfortunate must all be provided for, but the wherewithal for such care must be forthcoming from the accumulations of industry. The reservoir of plenty can be tapped only as long as industry can keep the reservoir filled, and a high standard of living for all can only be realized only by a free and active industry.

Marxism and its product, communism, have given rise to movements such as fascism and nazism, aimed at protecting the social body and preventing the disruption of capitalistic enterprise. These and other similar movements are antidotes against the spread of the infectious communistic doctrine. Countries such as Germany and Italy

which have been directly exposed to the spread of the Marxian doctrine have built up powerful anti-communistic organizations which have checked the advance of communism, but in so doing they have built up autocracies which are just as undesirable as the communism they were intended to defeat.

Just as communism destroys individualism by fostering autocratic state authority, so does fascism and naziism. Regardless of the fact that communism and fascism are opposite forms of political philosophies, the result of both is the ultimate destruction of individual rights and a subservience to a stifling central authority.

Democracy has been the result of the supreme effort of the eighteenth and nineteenth centuries to preserve individualism in human society. The Republic of the United States is the most outstanding example of this attempt. Democracy is being assailed both from within and without. Subversive movements of every description, in addition to communistic and fascistic movements, are clutching at the very heart of democracy. From without, propaganda is leveled at capitalist democracy by communist, fascist, and nazi agencies through the medium of foreign papers, books,

paid agents, consular agents, and refugees. From within, a steady attack is being conducted against the present system. Our centers of learning, in particular, are breeding places for social discontent. It is unquestionably true that this attack on the capitalistic system by our professors, many of whom are subsidized by the very capitalists they attack, was to be expected since they have had the opportunity to study Marx and at least found some semblance of science there. The so-called bourgeois philosophers have given the students of history nothing that could be considered scientific even by a long stretch of the imagination. Critics in all walks of life have not hesitated to advocate complete abandonment of our soundest heritages, and so-called statesmen themselves suggest radical changes in our system of government. Even the constitution of the United States, the very foundation of our individual rights, has come in for a large share of condemnation and abuse.

The radical attitude of American labor unions, which is tolerated and abetted by a national administration which fails to understand and is blind to the fundamental relationships within its own

structure, is perhaps the most disquieting aspect of our present political situation. Holding as it does the balance of power by reason of its voting strength, labor in America could readily precipitate America into communism. Marxists appreciate this and are losing no time in their "boring from within" tactics. It is more important than ever that American labor realize that the source of employment is a free and unrestricted industry, that the best interests of labor lie in the development of business, encouragement of investment, and the restoration of general confidence which has in the past and will again in the future produce the highest standard of living of any laboring class in the entire world. When a people envy their wealthy members it is a sign of social ill health, usually developed by false teachings. The greater the number of wealthy, the greater the opportunities for all. The wealthy person can spend only so much on himself, and the rest must be invested. It is this invested capital that makes opportunities for all, and in this respect the interests of both the laborer and the capitalist are identical.

Following the last depression, which began with the stock crash of 1929, the radicals of the country

found the population more receptive to their propaganda, and waves of radical reforms have deluged the country. Just why the American democracy has not been completely submerged by radicalism is difficult to understand. Even old line professional politicians have assumed the role of reformers and nothing has been too sacred for change or revision. Every species of crack-brained idea has been brought out as a cure for our social ills, and experimental legislation has been the order of the day. Depressions, as well as periods of prosperity, have had their causes; fluctuations are to be expected within depressions and within periods of prosperity. Uniformity is not the order of nature; a perpetual period of prosperity or depression is only the hasty notion of the dreamer. The American republic has passed through five prosperity eras and five eras of depression; each time the ship of state has weathered the storm and has emerged stronger than ever, and it is to be anticipated that there will be still other periods of depression and prosperity. Each upward swing has been followed by a downward glide that was faster down than up, and each time the populace counted noses after the crash, and, sadder but

wiser, vowed not to repeat the same mistakes again.

Following the last depression period, however, the capitalistic system itself has been held responsible for depression. The radicals quote Marx, who stated that, "the capitalistic system has inherent within it the elements for its own destruction". And the younger Marxians jubilantly state, "Capitalism is being transformed. A program of readjustment must be designed to solve the economic crises". These attempts to undermine and destroy the basic processes of our individualistic-capitalistic system are dangerous. We must have reforms, to be sure, and at times the body politic runs a fever that needs attention, but we must prevent the quack political doctors from destroying the patient altogether.

In the deluge of fault finding the machine, too, has received its large share of blame. From many sources, and particularly radical sources, comes the contention that the evils of modern life are to be traced directly to the machine, that the machine is displacing labor and thus causing unemployment with its attendant misery and distress. It is stated that the machine is resulting in a mechan-

ized culture which is destroying the finer purposes of living. Such objections to the machine could only be voiced by those who are entirely unaware of the true place of invention in the world of man. To ascribe to the machine the evils of the modern world is to miss entirely the significance of invention. Inventions, rather than being responsible for our ills have been our greatest benefactor and will ultimately be the means for the liberation of mankind. To live is to invent, and one cannot stop living or repudiate the entire evolutionary process. Throughout every day of our lives we adjust and adapt ourselves and are constantly making new discoveries which lead to new machines. This process cannot cease unless we revert to savagery and an animal-like existence.

Actually the percentage of the total population employed has been greatly increased since the advent of the machine; employment is greatly on the increase in spite of the seeming displacement of labor by labor saving devices and mass production methods. Each invention results in new jobs, not only in the production of the invention itself but in its sale and distribution. Very little effort may be expended in the actual production of an

article, but gigantic advertising, selling, and distributing agencies are at work disposing of the article. Entire new industries have grown up, even within the memory of young people, such as the radio, motion pictures, the airplane, the automobile, and other industries employing millions of people. Invention has produced these gigantic enterprises, and new inventions will produce still greater businesses and industrial enterprises.

The future lies in the direction of more inventions and more machines for better living—not less. Inventions have lifted man from savagery to civilization and will ultimately usher him into a new world filled with achievements far exceeding the expectations of our most enthusiastic and optimistic prophets. Civilization is the product of the machine, beginning with the simplest primitive tools and methods of production, which were the first machines, and culminating in the vast and intricate machinery and technique of modern life. Man became *homo sapiens* because of the machine.

CHAPTER VI

War

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WAR

THE IMPLICATIONS of invention as presented here are extremely vast and far-reaching and once adequately understood the principle can be applied in every phase of human activity. The bridge between savagery and civilization is invention, and the key which will unlock many of our social and economic problems is to be found in the explanation of the phenomenon of invention. Our examination of the phenomenon of inventions has been brief, as we have presented only a swift survey of its possible applications.

Our survey would be incomplete, however, if we failed to consider the relation of invention and war. At the present writing the subject of war is uppermost in the minds of men throughout the world. Inventions have not only determined the course of man's peaceful pursuits but also his warlike activities. Man has been referred to as a creature of war—a fighting animal—and down

through the centuries the history of man has been a series of wars. All wars invariably have been won by the men with superior fighting equipment, that is to say, better inventions. As stated before, the primitive ape-man who was first able to sense the added power of a club in his hand quickly vanquished his adversary, who was equipped only with his bare hands. Similarly in the animal world, those animals with sharper teeth, stronger claws, or faster locomotion, etc., survived over those not so well equipped. Likewise, modern man wages war with superior claws and faster means of locomotion in the form of devastating guns, huge tanks, and numerous other mechanical equipment, such as automatic arms capable of laying down screens of fire, parachute troops, and airplanes with diving speeds of 500 to 600 miles per hour.

Superiority of weapons has invariably determined the victor in the struggle for dominance, whether in single combat or in battles between armies. As a result of invention man has become the dominant animal; the savage with his club and spear has disappeared from the face of the earth and given place to modern man with his magazine

rifle and machine gun. In the competitive struggle no nation can safely permit its weapons to become inferior to those of a possible enemy. Invention in the Stone Age resulted in the bow and the flint arrowhead, in the Bronze Age in the spear, the sword, and the shield, and in the Iron Age in the javelin. In the fourteenth century infantry fought with the halberd, a combination of spear and battle axe. In the sixteenth century gunpowder was used on the battlefield. Various forms of guns were invented, beginning with the arquebus and terminating in the flint lock of the seventeenth century. With the invention of the bayonet infantry men were armed with a combination of flint lock and bayonet. The nineteenth century produced the percussion cap, the rifle, the breech loader, the magazine rifle, and the machine gun. In the present century, advance in war equipment has been extremely rapid. Steel has played a very important part in recent inventions such as helmet, bullet proof armour, tanks, large guns, and all the complicated machinery of modern warfare which would be impossible without the invention of steel. Inventions in chemistry have also contributed many new features of modern war such as high explosives and poisonous gases.

The production of new weapons has meant the development of new methods of attack and defense. Technique of war including tactics and strategy has undergone as many variations as there have been changes in weapons. The unwieldy phalanxes of ancient armies gave way to the nimble maniples of the Roman legions, who rushed with short swords into the ranks of spearmen too crowded to wield their spears. The legions were later helpless against the swarms of mounted Parthian bowmen, and in turn bowmen were powerless against men at arms. The bullet displaced the sword, and the heavy columns were displaced by more flexible columns. Modern warfare, because of new instruments including the airplanes, is rapidly changing war technique and making obsolete methods used in the first World War. The German blitzkrieg is just another step in the march of invention applied to war.

Inventions will ultimately so completely harness the forces of nature that wars for the acquisition of resources and living space may no longer be necessary, but other causes for war will be found. A world federation may curb international war, but war would reappear as civil wars. No

superstate can repress the expansion of a vigorous people. A nation is great not only because of its resources, its trade and accomplishments, but also because of its fighting equipment, war technique, and the capacity to defend its acquisitions. History has recorded on its pages the rise and fall of many people who have risen to power and influence only to lose their elevated position because of the debilitating effect of easy living and the neglect of their defenses. This is exactly what has been happening recently in many countries. In place of military preparedness we see the disarming effect of pacifistic preachments.

"Peace" cry the pacifists, and they are very sure of their stand, purpose, and virtue, but like many other aspirants to Utopia they succeed only in inviting destruction. The pacifists do not understand that the evolutionary process does not have its origin in human concepts of right or wrong, that an "ideal" does not shape and determine human progress, that struggle is the order of nature, and that any country which through any cause or for the sake of any doctrine neglects its technical possibilities, constructive or useful in event of war, is not the kind of country which will thrive and survive.

A national policy of appeasement and arbitration in the presence of aggressive expansion on the part of a neighboring nation is only suicide. No people, no matter how great and powerful, can permanently ignore the inroads of weakening doctrines such as pacifism. Pacifism is an essential objective of collectivism, since collectivism would substitute for natural struggle some inert form of human relationship.

Collectivism in the form of communism and socialism seeks to destroy the vital forces of individualism. Individualism trys to protect and perpetuate itself because only through freedom can individualism grow. "For war is inherent in the . . . way of life. And war will persist until the . . . races achieve a spiritual abdication in which they will prefer to abandon to others the fruit of their labors, scorn to receive more than they give, cast aside their present ideals of manhood and honor, and substitute for them the bleak ideas of service and self-effacement. Yet these passive qualities are exactly those which spell suicide to a man, to a race and to a civilization." [1]

[1] John Carter, *Man Is War*, p. 6 (Indianapolis: Bobbs-Merrill Co., 1926).

The veneer of civilization is extremely thin. Man, like all creatures, is a product of a fierce struggle. The quantity of blood that has been shed in the evolution of man would fill oceans and the number of dead resulting from actual combat and the effects of war could not be counted except in staggering figures. It is not reasonable to expect, therefore, that this creature, called man—a product of bloody strife down through the ages—should suddenly emerge from a past of carnage and cease to make war. Even in times of peace a constant struggle ensues, only at a slower tempo. In war, man attacks his enemy and attempts a quick knockout, while in times of peace man struggles with his adversary in trade and commerce, in the professions and in the arts, with lesser intensity and over a long period of years.

During periods of peace the virtues and benefits of peace are alone extolled and only the destructive effects of war are stressed. But war nevertheless has also its benefits, such as the development of national consciousness and respect for authority, inculcation of discipline and the promotion of physical improvement. Rivalry in its extreme form of war becomes a great stimulant which cleans up

stagnation in individual and national life. It seems hardly necessary to state that regardless of advantages or disadvantages of war the successful waging of war is imperative for the prevention of servitude of a people or for survival itself. There are times when man must wage war or perish.

The assumption that scholars have been making is that human nature is changing, that it is improving, that it is being educated to the requirements of an ideal universal peace. The assumption is wrong; human nature is constant and non-changing. Only inventions and the products of inventions change. The struggle of the jungle is reduced only to the extent that inventions provide the means and wherewithal for a reduced struggle. With an abundance of food, for instance, provided by improved methods, comes a more liberal ethics regarding the problem of sustenance, and with a shortage a reversion back to primitive ethics may be anticipated. Man is a creature of environment and subject to natural laws in spite of all the moralists.

War, if it should ever cease, will not cease because human nature improves or because of the "operation of an humanitarian principle", but be-

cause war will have become physically impossible. War is no longer waged with stone hatchets or bows and arrows. War is waged not by armored knights but by armored cars—not by throwing stones but by throwing bombs. The methods of war are improving and must eventually become so deadly as to make war impossible. War must ultimately mean mutual destruction. Already the destructiveness of war has been a deterrent, and may ultimately be outlawed, when both sides realize that total obliteration for both may be the consequence of a declaration of war.

For the present and the immediate future, however, we must look not to the pacifists for protection and for the perpetuation of our institutions, but to the leaders of our armed forces. The common enemy today are the pacifists. Pacifism lulls the mind of the people and plunges the population into a sense of false security. Pacifism in any country becomes a powerful ally for an enemy country. A false sense of security has destroyed many a nation and, in a world of constant strife, of all false positions pacifism is the worst.

The responsibility of much of our present strife, both national and international, the political dis-

organizations, and the present war itself may be laid at the door of communism, with its basic doctrine, the theory of Karl Marx. This is not a distorted premise; let us review the history of preceding events. The Bolshevik revolution in Russia in 1918 established communism as a system of government and put into actual practice what was up to that time merely a theory. It was but a short time before it became apparent to political observers that theory and practice were two different things, that what appeared workable on paper would not function under actual conditions. Among the first to sense a vital flaw and to see the non-workability of communism in actual practice was Mussolini. He and his followers seized control of the Italian government in order to save it from the chaos of communism. In Germany Hitler did the same thing. In both instances definite and positive objections to communism became so powerful as to make possible the complete overthrow of the existing government. If it had not been for the inroads of communism in these two countries neither fascism nor naziism would have been born.

The origin of fascism and naziism is to be found in the self-perpetuating and defensive efforts of capitalism and if limited to that purpose would be a sound political effort. However, in both Italy and Germany, once having acquired political power and having stemmed the tide of communism, fascism and naziism became identified with other questions, and in Germany especially with post war rehabilitation, vengeance, and liberation from the oppression of the Versailles treaty. Hitler, with carefully studied tactics has whipped the German people into a veritable dynamo of energy and action, and has made himself a liberator of the German people. It is but a short step from liberation to annexation, and what was first intended only to be a war of liberation has become a war of German conquest. Considered in this light our contention that the second world war is to be directly attributed to the spread of communism is not without sound foundation. It is thus that unsound doctrines affect the normal course of human events.

The extreme conflicting points of view on all political and social issues the world over can be ascribed to a lack of social and political science and

this science is unattainable without an understanding of the problem of inventions as here set forth. Before a true science of sociology and of politics can be achieved the true nature of man must be understood, and we contend that the nature of man and his place in the evolutionary scheme of things can be explained only by the explanation of the phenomenon of inventions. Existing social science is quite powerless to settle anything scientifically and convincingly, and the question of war is no exception to this. We have been living in an age in which an evolutionary science of human society has been lacking; there has been no way of distinguishing between devised human schemes and actual historical process.

Inventions determine peaceful human existence, and inventions also determine the manner and mode of warfare. In view of recent inventions in the art of war, America's natural protecting factors can no longer save this country from attack and from foreign wars. To forestall and frustrate such possibilities she must first take care of the pacifists at home and other numerous subversive tendencies. America, the vanguard of capitalism, must be well

armed, and for that she must depend on her inventors, her generals, and her admirals.

And what is the United States to do in the presence of the communistic and totalitarian drive to defeat the capitalist nations of the world through Asiatic, Mexican, and South American penetration? Is she to stand idly by until the plague spreads and becomes unmanageable? These are new developments and must be met not with words but with arms and force. They must be met in this wise or America must cease to be a great nation. Exhortations and protestations against wars are unavailing in the face of the evolutionary struggle for existence which is as active in the world of man as it is in the natural world. A thousand years of preachment against war, terminating in two great wars, should be convincing even to the most skeptical that war is not to be abolished by any preachment, that the old law of survival of the fittest is still a law, and that the country with the best technique and resources will predominate over the lax, lazy, and inefficient nations.